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Morphology and review of the odd genus *Rhadinoscelidia* Kimsey, 1988 (Hymenoptera, Chrysididae, Loboscelidiinae)

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Abstract

The small chrysidid genus *Rhadinoscelidia* Kimsey, 1988, is reviewed and the new species *Rh. chaesonensis* **sp. n.** is described. Peculiar deformations of the head are documented in a large series of one species, *Rh. malaysiae* Kimsey, 1988, from Thailand.

Keywords

Loboscelidia, Oriental Region, Thailand, Hainan, Laos, Java, Malaysia

Introduction

The subfamily Loboscelidiinae contains two genera *Loboscelidia* Westwood, 1874, and *Rhadinoscelidia* Kimsey, 1988 (Kimsey and Bohart 1991). Loboscelidiines are characterized by the antennae inserting horizontally on a shelf-like projection mid face, the vertex is prolonged posteriorly into a neck-like projection; the pronotum has a short line of ribbon-like setae along the anterolateral corner; the tegula is very large, covering

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both wing bases and is held in place by a mesopleural ridge; the mesopleuron is smooth without sculpturing, the propodeum has an ear-like lateral projection, and the forewing lacks a stigma, costal and subcostal veins. *Rhadinoscelidia* can be characterized by further reductions of some of these features and a different arrangement of the patches of ribbon-like setae seen in *Loboscelidia*.

The chrysidid genus *Rhadinoscelidia* is rarely collected and is the most oddly modified of the chrysidid wasps. To date the genus is only known from Hainan Island (China), Thailand, Laos, West Java (Indonesia) and Malaysia (mainland) (Fig. 1). However, *Rhadinoscelidia* species probably occur throughout Southeast Asia, including Cambodia, Viet Nam, southern mainland China and Myanmar.

Male and female *Rhadinoscelidia* are difficult to separate. Although the number of external metasomal segments is sexually dimorphic in *Rhadinoscelidia* as it is in *Loboscelidia* the segments are difficult to distinguish using simple stereomicroscopy, and exserting the genitalia is generally necessary to determine the sex of a specimen.

Nothing is known about the biology of *Rhadinoscelidia* species. Unlike the situation in *Loboscelidia* where museum specimens are predominantly male, there are far more female *Rhadinoscelidia* than males among the small number of specimens in collections.

There are some unusual features in this group in addition to the odd structural modifications that characterize the genus. A large series of specimens from Thailand shows marked and inconsistent asymmetry of the head as shown in Figs 2–8. The reason for this asymmetry is not clear. However, it may affect the value of species distinctions based on facial dimensions, facial sculpturing, presence or absence of carinae, and the shape and position of emarginations or projections on the back of the head.

In addition, these wasps have what appear to be a number of secretory sites on the meso- and metasoma. All specimens examined had clusters of white, crystalline material in three sites, a fovea at the base of each forecoxa, surrounding the petiolar insertion on the propodeum, and on the apex of metasomal sternum I (as in Fig. 10a–c).

Materials and methods

Specimens were borrowed from the following museums, and repositories are indicated by the acronyms: CNC – Canadian National Insect Collection, Ottawa, Ontario; QSBG – Chiang Mai Royal Botanical Garden, Chiang Mai, Thailand; ROM – Royal Ontario Museum, Toronto, Canada; SCAU – Hymenoptera Collection, South China Agricultural University, Guangzhou; and UCRC – Entomological Research Museum, University of California, Riverside, USA; USU – Utah State University, (American Entomological Institute collection), Logan, Utah, USA.

Morphological terminology follows that used by Kimsey and Bohart (1991). The hindwing lacks venation, so wing vein characters are only for the forewing. Wing veins are given in the text as abbreviations: Cu = cubital vein, cu-a = cubital-anal cross vein,

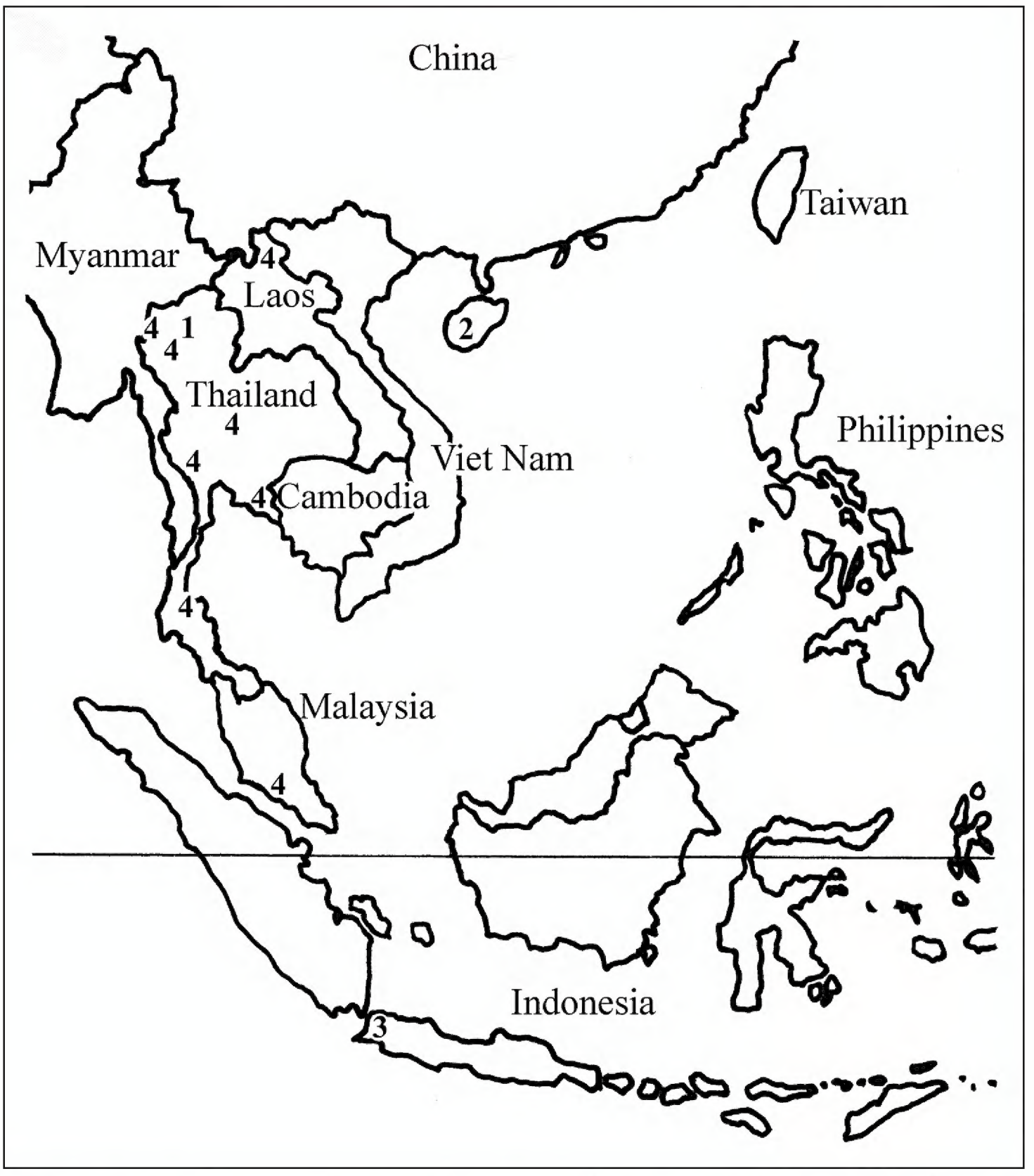


Figure 1. Distribution map of *Rhadinoscelidia* species. **1** *Rh. chaesonensis* **2** *Rh. delta* **3** *Rh. halimunensis* **4** *Rh. malaysiae*.

M = medial vein, R = radial vein, Rs = radial sector, R1 = first radial branch. Head length versus width is measured from the apex of the cervical extension to the furthermost point of the frontal projection and across the widest part of the head in lateral view. Antennal articles are measured at the point of greatest breadth and compared with the total length of the article. Wing veins are compared relative to the length of R1. Pronotal dimensions are measured from the medial length of the pronotum in dorsal view to the distance between the apices of the posterolateral angles.

Systematics

Genus *Rhadinoscelidia* Kimsey

Rhadinoscelidia Kimsey, 1988:77. Type species: *Rhadinoscelidia malaysiae* Kimsey, 1988: 78. Monobasic and original designation.

Diagnosis. *Rhadinoscelidia* is distinguished from *Loboscelidia* by the extreme reduction of the wing venation, short male flagellomeres, slender legs, and, in particular, the strongly constricted postocellar area of the head.

Description. Vertex strongly arched dorsally, with ocelli at apex and sharply declivous posteriorly; genal fringe short, not extending onto cervical plate, separated from ventral surface by carina or flange, with separate anterolateral fringe; male scape length twice or more eye height, without transparent flange; male F-II-X less than twice as long as broad, apical flagellomeres about as long as broad; pronotum narrowed medially in dorsal view, broadly rounded laterally and dorsally, anterior fringe located on anterolateral angle or tubercle, less than 0.25× eye height; mesopleuron with omaulus and without indication of scrobal sulcus; scutum with notauli; scutellum as long as scutum; metanotum narrow and parallel-sided; forewing without A or cu-a, venation occupying less than one-fifth of wing; membrane evenly stained, wing 0.2–0.3× as long as broad; femora with small apical flanges; tibiae without transparent flange.

Distribution. The genus is known from Hainan Island (China) (Liu and Xu 2011), Thailand, Laos (Kimsey1988), Indonesia (West Java) (Kojima, Ubaidillah 1988) and Malaysia (mainland) (Kimsey 1988).

Key to species of *Rhadinoscelidia*

1 Hindtarsal claw edentate; eye small, separated by more than half its diameter from ocelli in lateral view (Figs 9, 10); vertex rounded without carina or line posterior to or laterad of hindocelli (Fig. 10)..... ***chaesonensis* Kimsey, sp. n.**

– Hindtarsal claw with one small subsidiary tooth; eye larger, separated by half its diameter or less from ocelli in lateral view (as in Fig. 11); vertex angulate and/or with carina or line posterior to and/or laterad of hindocelli **2**

2 Flagellomere I twice as long as broad; frons with Y-shaped carina extending ventromedially from midocellus; West Java..... ***halimunensis* Ubaidillah**

– Flagellomere I 1.3–1.6× as long as broad; frons with wrinkles or fine carinae radiating ventrally from midocellus..... **3**

3 Vertex without transverse carina or sharp angle behind ocelli; flagellomere XI 1.9× as long as broad; Hainan Is., China..... ***delta* Liu, Yao & Xu**

– Vertex with transverse carina or sharp angle behind ocelli; flagellomere XI 1.6–1.7× as long as broad; Laos, Malaysia, Thailand ..... ***malaysiae* Kimsey**

Species descriptions

Rhadinoscelidia chaesonensis sp. n.

http://zoobank.org/18CF799F-6494-4426-B3DA-6D6F903F04B3
Figs 9, 10

Diagnosis. This species has distinctively small eyes, in lateral view the eye is separated from the vertex apex by more than half its diameter. In addition, the hindtarsal claw is edentate and the vertex is rounded without a transverse ridge or line.

Female description. Body length 2 mm; forewing length 2.3 mm. *Head:* length 1.8–1.9× height in side view; frontal projection shape rectangular in front view, strongly projecting horizontally; frons with shallow wrinkles radiating ventrally from midocellus (Fig. 10); vertex elevated, but rounded across hindocelli, without low ridge extending from vertex along inner eye margin, cervical expansion broadly curved in profile, with anterolateral patch of longer, dense ribbon-like setae (Figs 9, 10); occiput laterally with low ridge behind eye backed by short row of broad ribbon-like setae; eye separated from hindocellus by more than 0.5 eye length in lateral view; gena without scale-like setae; scape length 5× breadth, 0.9–1.0× head length in side view; flagellomere I length 1.8–2.0× breadth; flagellomere II length 1.2× breadth; flagellomere XI length 1.8× breadth. *Mesosoma*: highly polished and impunctate; pronotal length 1.5× breadth; fore and midfemur with short, erect, apically spatulate setae on dorsal surface; hindtibia nearly asetose; hindtarsal claw edentate; forewing venation 0.13× wing length; R 0.5× as long as Rs; Cu 0.8× as long as M (Fig. 10). *Color*: reddish brown; forewing membrane transparent to brown in bands, veins brown.

Male. Unknown.

Type material. Holotype female: Thailand: Lampang, Chae Son NP, campground/lavatory, 18°49.894'N, 99°28.354'E 467m, Malaise trap, 1-7/v/2008, B. Kwannui & A. Sukpeng leg., T5309 (QSBG). Paratype female: same data as holotype, except 21-30/v/2008, T5305 (BME).

Distribution. Thailand: Lampang Prov.

Etymology. The species is named after the collection site in Chae Son National Park.

Rhadinoscelidia delta Liu, Yao & Xu

Rhadinoscelidia delta Liu, Yao & Xu, 2011: 13. Holotype female; China: Hainan, Mt. Wuzhishan (SCAU).

Diagnosis. The most distinctive features of this species are the rounded vertex, frons with fine carinae radiating ventrally from midocellus and flagellomere I less than twice as long as broad.

Female description. Body length 2.3 mm; forewing length 2.5 mm. *Head:* length twice height in side view; frontal projection rectangular in front view; frons smooth, not microstriate, with low ridge extending from vertex along inner eye margin; vertex without foveae, with transverse carina or fold behind hindocelli; cervical expansion strongly curved in profile, with anterolateral patch of longer, dense ribbon-like setae; occiput laterally with low ridge behind eye backed by short row of broad ribbon-like setae; eye separated from hindocellus by 0.2 eye length in lateral view; gena without scale-like setae; scape length 5× breadth, 0.9–1.0× head length in side view; flagellomere I length 1.3× breadth; flagellomere II length 1.2× breadth; flagellomere XI length 1.9× breadth. *Mesosoma*: integument polished, impunctate; pronotal length 1.2× breadth, apicolateral margin curved; forefemur without spatulate or expanded erect setae on dorsal surface; hindfemur with scattered setae dorsally but nearly asetose ventrally; forewing venation restricted to 0.2× wing length; R 0.5× as long as Rs; Cu 0.9× as long as M. *Color*: brown; forewing membrane transparent to brown in bands, veins brown.

Male. Unknown.

Distribution. China: Hainan Prov.; no specimens examined (information provided by Zia-fu Xu).

Rhadinoscelidia halimunensis Ubaidillah

Rhadinoscelidia halimunensis Ubaidillah in Kojima & Ubaidillah, 2003: 200. Holotype male (?); Indonesia: West Java Gn. Halimun National Park (Museum Bogorense, lost?).

Diagnosis. This species can be distinguished from other *Rhadinoscelidia* species by the frons having a Y-shaped carina and flagellomere I twice as long as broad.

Female. Unknown.

Male description (based on the original description). *Body length* 2.7 mm; forewing length 3.5 mm. *Head:* length 1.9× height in side view; frontal projection shape; frons smooth, not microstriate, with low ridge extending from vertex along inner eye margin; vertex without transverse fovea, vertex expansion strongly curved in profile, without low ridge extending from vertex along inner eye margin, cervical expansion broadly curved in profile, with anterolateral patch of longer, dense ribbon-like setae; occiput laterally with low ridge behind eye backed by short row of broad ribbon-like setae; eye separated from hindocellus by 0.4× eye length in lateral view; gena without scale-like setae; scape length 6.7× breadth, 0.8–0.9× head length in side view; flagellomere I length 1.6× breadth; flagellomere II length 1.5× breadth; flagellomere XI length 1.5× breadth. *Mesosoma*: integument smooth, impunctate; pronotal length as long as broad; fore and midfemur without short, erect, apically broadened setae on dorsal surface; hindtibia nearly asetose; forewing venation 0.15–0.16× wing length; R 0.5× as long as Rs; Cu 0.8× as long as M. *Color*: brown, brown; forewing membrane transparent to brown in bands, veins reddish brown.

Distribution. Indonesia: West Java; no specimens were examined.

Discussion. Both authors have been contacted and the type could not be located. The original illustrations of the abdomen and antennae are proportioned similarly to females in this group and it may very well be that the holotype was actually female.

Rhadinoscelidia malaysiae **Kimsey**

Figs 2–8, 11

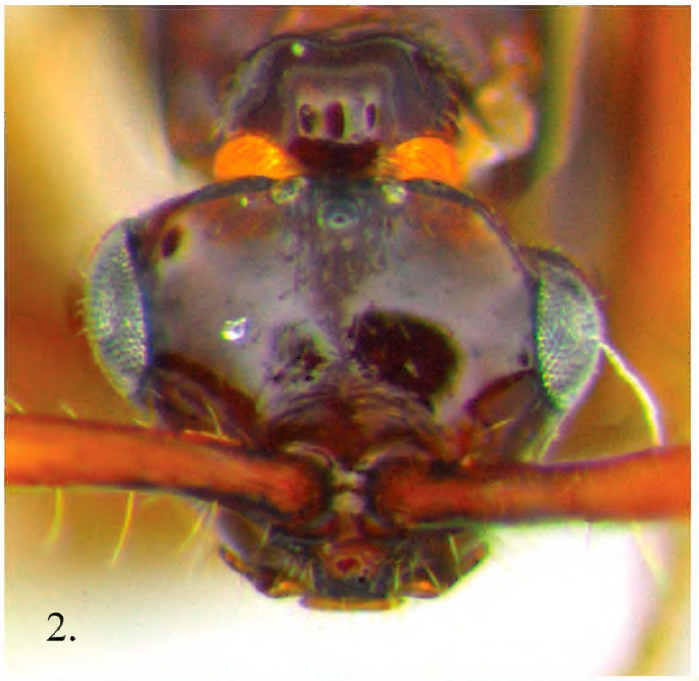
Rhadinoscelidia malaysiae Kimsey, 1988: 78. Holotype male: Malaysia: Pasoh Forest Res., Negri Sembilan (USU).

Diagnosis. This species can be distinguished from the others by the dentate tarsal claw, flagellomere I less than twice as long as broad, the frons smooth without microstriae, and the vertex with a transverse carina or angle.

Female. Unknown.

Male description. Body length 2.0–2.5 mm; forewing length 2.3–2.8 mm. *Head:* length 1.8× height in side view; frontal projection rhomboid in front view; frons smooth, not microstriate; vertex without transverse foveae, with low ridge extending from vertex along inner eye margin, cervical expansion strongly curved in profile, with anterolateral patch of longer, dense ribbon-like setae (Fig. 11); occiput laterally with low ridge behind eye backed by short row of broad ribbon-like setae; eye separated from hindocellus by 0.1–0.2 eye length in lateral view (Fig. 11); gena without scale-like setae; scape length 5.4× breadth, 1.0–1.1× head length in side view; flagellomere I length 1.6× breadth; flagellomere II length 1.5× breadth; flagellomere XI length 2.5× breadth. *Mesosoma*: integument smooth, impunctate; pronotal length 1.1× breadth; fore and midfemur with short, erect, apically broadened setae on dorsal surface; hindtibia nearly asetose; forewing venation 0.08–0.10× wing length; R 0.5× as long as Rs; Cu 0.7–0.8× as long as M. *Color*. brown; forewing membrane transparent to brown in bands, veins brown.

Distribution. MALAYSIA: Pasoh Forest Res., Negeri Sembilan. LAOS, **Phongsaly Prov.**: Ban Sano Mai, 21°21'N, 102°03'E, 19–26/v/2004, 1150m, V. Kubáň. THAILAND: **Bangkok**: 180km ne Bangkok, Khao Yei NP, 800m, 10–16/iv/1990, N.T., B.V. Brown; **Chanthaburi Prov.**: Khao Khitchakut NP, Khao Prabaht peak, 12°50.41'N, 102°9.83'E, 875m, Malaise trap, 6–13/iii/2009, Suthida & Charoenchai leg. (T4060); Soi Dao, 14°47.00'N, 101°22.00'E, 7–21/iii/2005, Malaise trap; **Chiang Mai Prov.**: Doi Chiangdao NP Huai Na Lao, 19°24.731'N, 98°55.315'E, 500m, pan trap, 3–8/v/2008, S. Jugsu & A. Watwanich leg. (T5803, T5806, T5809); 19°24.419'N, 98°55.237'E 549m, Malaise trap, 7–14/viii-23–30/ix/2007, S. Jugsu & A. Watwanich leg. (T5668, T5717); 19°24.978'N, 98°54.886'E, 526m, Malaise trap, 18–25/ix/2007, S. Jugsu & A. Watwanich leg. (T5695, T5813); Huai Na Lao, 19°24.731'N, 98°55.315'E, 500m, pan trap, 9–10/v/2008, S. Jugsu & A. Watwanich leg. (T5811); 19°18.803'N, 98°36.395'E, Malaise trap, 13–20/ii/2008, Anuchart & Thawatchai leg.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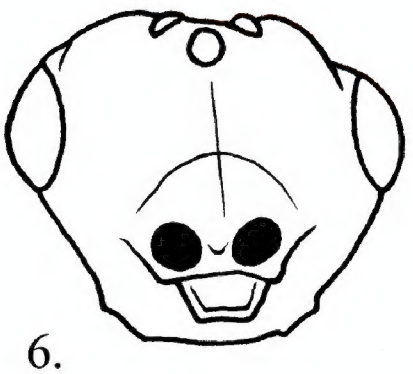
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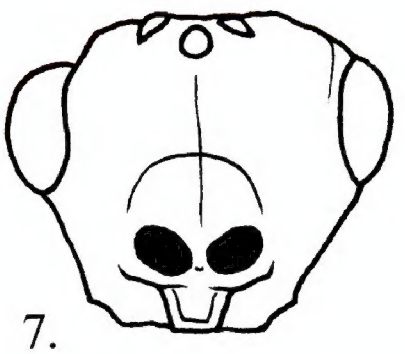
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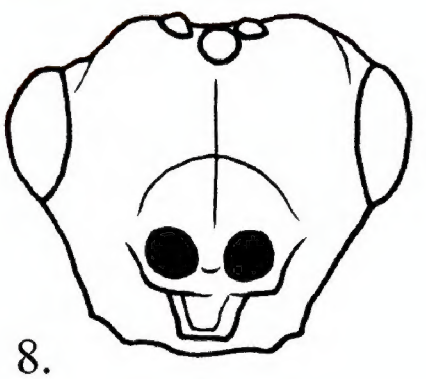
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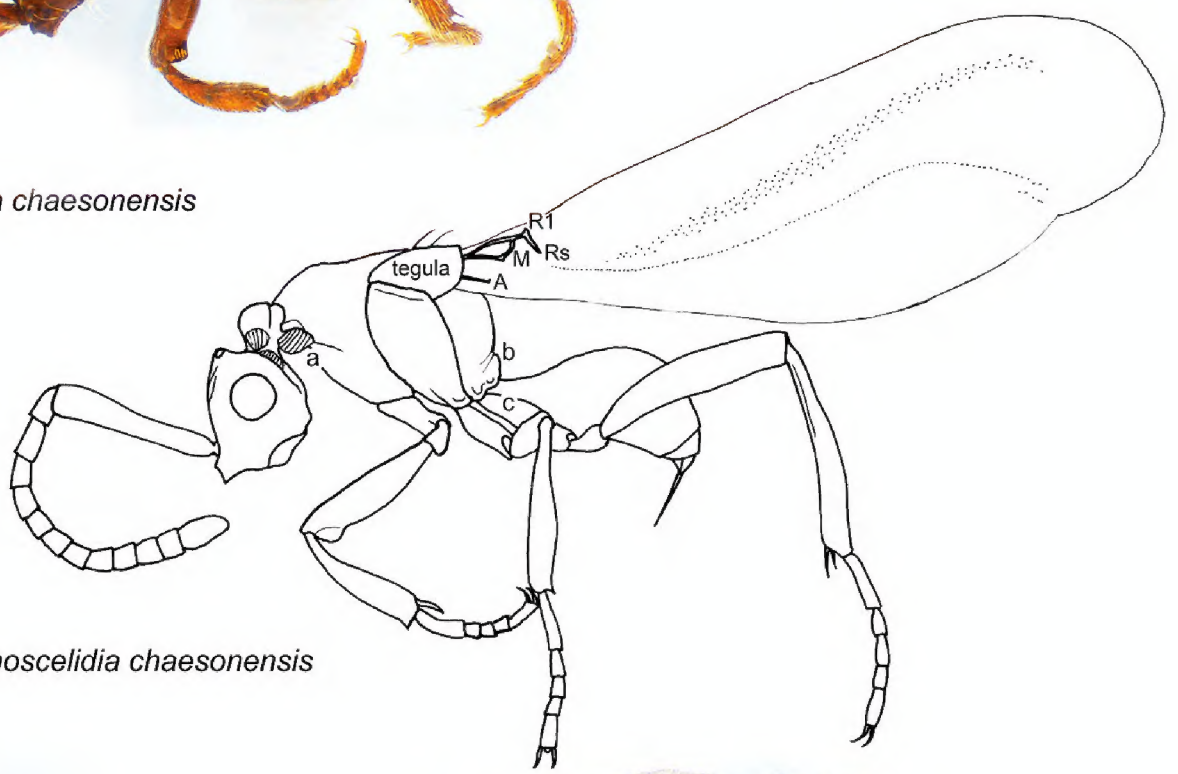
Figures 2–8. Front view of faces of individual *Rhadinoscelidia malaysiae*. **2–5** Photographs **6–8** Diagrams of Figs 2, 3, 5.

(T5609); **Kanchanaburi Prov.**: Khuean Srinagarindra NP, 14°38.123'N, 98°59.657'E, Malaise trap, 16–23/x/2008, Somboon & Daorueng leg. (T3462); 14°38.312'N, 98°59.643'E, 210m, Malaise trap, 7–14/v/2009, Somboon & Daorueng leg. (T4747); 2–9/iv/2009 (T4788); 14°38.441'N, 98°58.889'E, Malaise trap, 13–20/xi/2008, Som-

9. *Rhadinoscelidia chaesonensis*



10. *Rhadinoscelidia chaesonensis*

11. *Rhadinoscelidia malaysiae*

Figures 9–11. Lateral view of body. **9, 11** Photographs **10** Diagram. **a–c** possible secretory sites **A** anal vein **M** media **R1** radial vein **Rs** radial sector.

boon & Daorueng leg. (T4423); **Loei Prov.**: Phu Kradueng NP, Nampong/Pong Neep forest unit, 16°56.59'N, 101°41.61'E, 273m, Malaise trap, 26/iv-3/v/2008, Thonghuay Phatai leg. (T5127); **Mae Hong Son Prov.**: Namtok Mae Surin NP, 19°21.593'N,

97°59.254'E, 228m, Malaise trap, 26/viii-2/ix/2007, Manu Namadkum leg. (T5874); **Nakon Si Thammarat Prov.**: Namtok Yong NP, 8°10.434'N, 99°44.508'E 80m, Malaise trap, 2–9/ix/2008, U-prai;K. leg. (T3546); **Phetchabun Prov.**: Nam Nao NP, 16°43.695'N, 101°33.797'E, 921m, Malaise trap, 5–12/v/2007, Leng Janteab, leg. (T2657); 16°43.687'N, 101°33.754'E, 924m, Malaise trap, 19–26/v/2007, Noopean Hongyothi leg. (T2662); Kaeng Krachan NP, 12°47.963'N, 99°27.188'E, Malaise trap, 5–12/ix/2008, Sirichai & Prasit leg. (T4375); 12°49 03'N, 99°21.55'E, Malaise trap, 25–26/vi/2008, B. Brown; **Phitsanulok Prov.**: Thung Salaeng Luang NP, 16°52.64'N, 100°49.44'E, 481m, pan trap, 25–26/iv/2007, Pongpitak leg. (T5205). A total of 28 specimens were examined from BME; CNC, USU , University of California, Riverside, USA; Royal Ontario Museum, Toronto, Canada; Queen Sirikit Botanical Gardens, Thailand), including the holotype.

Discussion. This species probably occurs throughout much of Southeast Asia. Intensive collecting in other regions will probably produce as many specimens as the TIGER project did in Thailand.

Acknowledgements

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